Before the

Federal Communications Commission

Washington, D.C. 20554

In the Matter of	)	
	)	
Allocation of Spectrum Below	)	ET Docket No. 94-32
5 GHz Transferred from	)	
Federal Government Use	)	

To: The Commission

REPLY COMMENTS OF THE RADIO AMATEUR SATELLITE CORPORATION IN RESPONSE TO SECOND NOTICE OF PROPOSED RULE MAKING

The Radio Amateur Satellite Corporation (AMSAT) hereby respectfully submits its reply comments in response to the Second Notice of Proposed Rule Making (the Second Notice), FCC 95-47, 60 Fed. Reg. 13102, released March 20, 1995. The Second Notice proposes certain rules to govern frequency assignment and use of the first 50 MHz of spectrum transferred from Federal Government use. AMSAT wishes to respond to certain of the comments in this proceeding which addressed the 2390-2400 MHz or the 2402-2417 MHz allocations made in the First Report and Order, and states as follows:

I. Summary

1. AMSAT's comments in response to the Second Notice urged that no additional rules are needed in order to facilitate compatible sharing between the Amateur Service, the primary service in both band segments after the First Report and Order, and asynchronous data-PCS at 2390-2400 MHz and standard Part 15 devices at 2402-2417 MHz. We further stated that it would be not be appropriate to combine the 2390-2400 MHz segment and the

2400-2450 MHz segment for Part 15 use generally, and further suggested a guard band between the two segments.

2. AMSAT is pleased to observe that the bulk of the comments support our position, and that of the American Radio Relay League (ARRL) that no combination of these band segments should take place. A few commenters suggested, without any support, that the "allocation status" of Part 15 devices should be elevated to a co-primary status in those bands. AMSAT contends that there is no technical justification for such a suggestion and those making these comments do not understand the allocation status of unlicensed devices.

3. AMSAT contends that the comments of the data-PCS providers and computer companies are particularly appropriate, since they plainly state that there is a good deal of compatibility between asynchronous data-PCS and amateur operations. AMSAT believes that this proceeding represents a fine demonstration that advances in technology can be used to increase frequency sharing. We are confident that the rules proposed by the Commission for these devices in the First Report and Order represent good assurance that there will be compatibility between data-PCS and all amateur users in the 2390-2400 MHz band. Furthermore, because of the robust nature of the data-PCS devices, and the operating environments of those devices, it is predicted that there will be no, or at worst nominal, interaction between normal amateur operations in the 2390-2400 MHz band and data-PCS devices and systems. AMSAT is confident, therefore, that there will be minimal pressure from terrestrial amateur operations on the spectrum immediately above 2400 MHz, which

is already in use for amateur satellite downlinks and will come under even heavier use following the launch of the Phase 3D satellite currently scheduled for April 1996.

4. As to the comments relative to generalized Part 15 devices and amateur operations above 2400 MHz, there appears no concern about amateur interaction with those devices either. AMSAT agrees with most of the comments, however, that the 2390-2400 MHz band, set aside for amateur and asynchronous data-PCS, should be kept separate and apart from generalized Part 15 operation at 2400-2450 MHz. To permit such would be to encourage mass shifting of such devices downward to the 2390-2400 MHz segment. This could imperil the use of this segment for the asynchronous data-PCS applications.

II. No Need For Further Regulation to Accommodate Compatible Uses at 2390-2400 MHz or 2402-2417 MHz

5. The Comments in this proceeding make it apparent that no new regulations are needed in order to facilitate compatibility between Part 15 operation (including asynchronous data-PCS at 2390-2400 MHz) and amateur operation in the bands 2390-2450 MHz. The comments of Apple Computer state:

> "Data-PCS will support high-speed, ad hoc data communications via unlicensed devices in large part due to the underlying spectrum etiquette governing operation in the band. The spectrum sharing rules were designed to permit coexistence among dissimilar technical approaches, vendors, and applications, within a minimal set of rules. The rules call for channel sensing, algorithms for deferral and contention of transmissions, rules for searching for available channels, RF bandwidths between 500 kHz and 10 MHz, power proportional to bandwidth, and limits on channel acquisition and upon retention of the channel before recontention."
>
> Apple Computer comments, at 2,3.

It is these "spectrum etiquette" characteristics that make data-PCS compatible with primary operations in the Amateur Service. While AMSAT looks forward to the results of cooperative testing between Apple, and any other data-PCS manufacturers, and the amateur community to determine actual interaction parameters, we currently believe that there is little likelihood of problems between the two types of operation. In particular, Apple states:

> "...(L)ow power unlicensed data-PCS operations are generally compatible with amateur operations. The low power, low spectral power density, restricted antenna implementation, predominantly indoor operation, and channel-sensing algorithms required of data-PCS all suggest that the geographic area in which data-PCS devices could potentially cause interference will be relatively small, in most cases no more than a few hundred feet."
>
> Apple Computer comments, at 5.

Apple understands, as does AMSAT, that there can be cases in which an individual amateur's operations could be affected by the operation of data-PCS devices, but we believe that they will be rare, and that formal sharing arrangements will not be necessary.

6. To the same effect, AMSAT agrees with the comments of Compaq Computer Corporation, which notes that reasons why amateur and data-PCS operations are unlikely to interact --- making formal coordination requirements unnecessary and impractical. Noting first, as has the Commission, the traditional, and empirically apparent compatibility generally between Part 15 devices and amateur operations, Compaq notes that the operating environments of the two uses are quite different:

> "Neither Amateur Service use of 2390-2400 MHz nor data-PCS use of that band is continuous throughout the day or even large parts of the day. Rather, in both cases, use of the frequencies occurs episodically and, in the case of data-PCS, involves the transmission and receipt of information in short bursts. Thus, the very nature of the

> services...makes conflicting use unlikely...(T)he power and emission limitations applicable to data-PCS assure that, even if the number of Amateur facilities substantially increase over time, data-PCS will not interfere with the important public safety uses that are made of the spectrum. Thus, as a practical matter, conflicting use could arise, if at all, only in cases where a data-PCS device is being operated in extremely close proximity to the Amateur Service facility and both are operating at the same time; and the conflict would only affect the data-PCS device, which is portable. These conditions, if they arise at all, are certain to be exceptional. They do not necessitate the establishment of cumbersome, formal standards for coordination."
>
> ******
>
> "In any case, the nomadic nature of data-PCS service would make enforcement of restrictions on use of these devices extremely difficult. Similarly, short of restricting future growth of Amateur Service in the 2390-2400 MHz band, which the Commission has declined to do (citing the First Report and Order, at para. 17) there is no practical nor fair way of limiting amateur use of the band."
>
> Compaq comments, at 2,3.

AMSAT concurs with Compaq generally. While it is not entirely safe to conclude, at this point that there will be no adverse effect on Amateur operations from data-PCS at 2390-2400 MHz, it appears that, because the power and antenna gain of data-PCS systems are each strictly limited in accordance with Part 15.319-15.321 of the Rules, there will not be significant interference potential to amateur operations in the band. We believe that Compaq is correct in concluding that the best means, at this point, to address any problems that arise is on a cooperative, case-by-case basis.

7. Some comments urged the Commission to "upgrade the status" of Part 15 devices generally, including those at 2402-2417 MHz, by means of creating a new Part 16 radio service for unlicensed devices generally. The comments of the Consumer Electronics Group of the Electronic Industries Association and the Part 15 Coalition each urge some elevation in the allocation status of unlicensed Part 15 devices. A related argument was stated by

Motorola, which suggests that there may be some perceived (but not technical) incompatibility between the primary user (the Amateur Service) and the consumers of Part 15 devices. It urges that there should either be an elevation of data-PCS systems to "co-primary" in allocation status with the Amateur Service, or to define the parameters under which unlicensed devices are presumed not to cause interference. Motorola suggests, for Part 15 operations at both 2390-2400 MHz and 2400-2483.5 MHz, that a device operating at an average EIRP of 25 milliwatts or less measured in a 1 MHz bandwidth over a one-second period be presumed incapable of causing interference to any service of a higher priority.

8. AMSAT finds such arguments specious. Part 15 devices have no allocation status, and have had none, internationally or domestically. They are permitted on the basis that they not cause interference to licensed radio services, and that they must tolerate interference received from licensed radio services in the same bands. The Communications Act of 1934 is devoid of any authority to accord Part 15 type devices any allocation status at all; the only authority to permit unlicensed devices under the Act is with respect to radio control 307(e). The only provision for Part 15 devices in the Communications Act is for the Commission to regulate the interference potential of such devices. This, the Commission has done by permitting the operation of those unlicensed devices which it has determined are unlikely to cause interference to licensed services in bands allocated to one or more radio services. The benefits to the manufacturers of such devices under the circumstances are several: their products need not be licensed before they can be used by the purchasers. The equipment

itself need only be authorized by the Commission by type, pursuant to Part 2 Equipment Authorization requirements; they can operate with some degree of frequency agility and bandwidth variability; and they can be used for an infinite number of purposes, without any eligibility determinations on the part of the user. These benefits are at the cost of an absence of any priority in the subject bands relative to licensed radio services. The suggestion of Motorola and others that the status of such devices should be "elevated" would be tantamount to a change in the entire conceptual framework of regulation of Part 15 devices. It would mean that they would be entitled to the benefits of a licensed radio service but without any of the obligations attendant to shared users. Such a course would be certain to increase the administrative burden on the Commission. In the these days of downscaling of Government, this does not seem to be an appropriate course of action.

9. In addition, those who assert that the status of Part 15 devices should be "elevated" offer no basis for their contentions. They seem to assume, but do not even claim, and certainly do not document, that there will be interaction between Part 15 devices and amateur stations. Motorola states as follows:

> "Motorola agrees that, at a technical level, typical operations of these two services (sic) should raise little interference potential. However, Motorola is concerned that unlicensed PCS devices remain secondary(sic) to amateur operations. This is not a technical concern given the robust design of unlicensed devices. However, customers of Part 15 devices may develop negative perceptions of secondary status if primary users arbitrarily claim interference received...As a matter of equity, the FCC should elevate the status of unlicensed PCS in the 2390-2400 MHz band to co-primary with the Amateur service. As an alternative, Motorola recommends defining the parameters under which unlicensed devices are presumed not to cause interference."
>
> Motorola Comments, at 11,12.

The sole basis for Motorola's concern is that consumers may "develop a negative attitude" toward a device that is not permitted to cause interference to licensed radio services. AMSAT contends that there is not the slightest evidence that Part 15 device consumers have "developed a negative attitude" toward the devices under the current rules for the operation thereof in bands in which the Amateur Service has allocations, nor is there any evidence that amateurs have "arbitrarily" claimed interference. AMSAT further contends that, if Motorola and others who may share their fear are correct, unlicensed Part 15 devices should be limited to 2450-2483.5 MHz so that there is no possible interaction between them and amateurs. Although we do not believe it necessary, AMSAT would enthusiastically support such a change.

10. The Commission has adopted rules to facilitate cooperative, compatible use of the 2390-2400 MHz and 2400-2450 MHz bands between and among Amateur stations and Part 15 devices. The presumption by all commenters is that there will be no interaction between the two uses. Neither Motorola, nor any other commenter has offered any showing of technical incompatibility. In fact, Motorola admits that there is no technical incompatibility, and the ARRL, Apple Computer, and Compaq all agree. AT&T calls for additional studies. AMSAT understands that ARRL would agree to participate in any such further testing. However, AMSAT does not agree to AT&T's suggestion that the decision on further sharing rules be "deferred" pending the outcome of further tests. Amateur licensees should not be discouraged from making use of the band, by a threat that any instance of

interaction might result in a change in the allocation. No incompatibility can be presumed, nor inferred from the comments. Therefore, no additional regulatory restrictions are justified, and this issue should be brought to a swift conclusion.

III. There Should be No Combining of the 2390-2400 MHz and 2400-2450 MHz Bands for Part 15 Operation

11. It is no secret that there is substantial noise in the 2400-2483.5 MHz band from ISM devices, and from Part 15 devices. There is less noise in the 2390-2400 MHz segment. The data-PCS advocates have developed the spectrum etiquette that should permit successful shared operation at 2390-2400 MHz. Should the Commission permit generalized Part 15 operation in the band, there will be an inevitable migration downward, to avoid the noise in the 2400-2483.5 MHz band. The data-PCS users, and amateurs, which are themselves compatible, should not be disrupted by generalized Part 15 operation. There is no basis for any expansion of general Part 15 operation below 2400 MHz. Furthermore, AMSAT renews its contention that a guard band should be established to keep Part 15 and data-PCS systems apart. We suggest that the width of such a guard band should be 2 to 10 MHz and that its low edge should be 2400 MHz.

12. As AT&T points out, "(a)synchronous PCS devices and spread spectrum devices can plainly operate in their separate bands without causing problems to each other." AT&T, however, offers nothing that would suggest that there is compatibility between data-PCS systems and generalized Part 15 devices, spread-spectrum or otherwise, are compatible. It admits, however that "if spread spectrum devices can operate down to 2390 MHz without

interfering with the PCS devices, they can be further away from interference caused by the [ISM] devices, particularly the huge number of microwave ovens, centered at 2450 MHz." AMSAT contends that this argument illustrates why these two types of operation must be kept apart and underscores the utility of our proposed guard band.

13. AMSAT wishes to re-emphasize the unique application to which the segment immediately above 2400 MHz is being, and will be, put during the next quarter century and perhaps longer. It is, and will, primarily be used for the reception of relatively weak downlink signals from amateur satellites. Initially, only the first 2 MHz or so will be so used, but at least 10 MHz of spectrum are expected to be so employed in the years to come. AMSAT commends the Commission for its elevation of Amateur Radio Service allocation at 2402-2417 MHz to Primary. AMSAT urges the Commission to do the same for 2400-2402 MHz now that it is being released from Government use by NTIA. This will greatly assist AMSAT related organizations in other countries in their efforts to persuade their administrations to take similar action. Moreover, the Commission can take a simple further action that will greatly enhance the utility of this part of the spectrum for reception of relatively weak amateur satellite downlinks, as well as insuring the viability of data-PCS systems, by establishing a guard band between them and unlicensed Part 15 devices operating above 2400 MHz. AMSAT suggests that a minimum width for such a guard band is 2 MHz, with 10 MHz a much preferable figure. We contend that such a small amount of spectrum removed from that available to unlicensed Part 15 devices should not materially affect their viability. If it is contended that they must operate as far away as possible from

2450 MHz due to interference from microwave ovens or other Part 18 devices, this only emphasizes the need for the guard band we propose. For if this is their argument, it demonstrates that the manufactures intend to crowd as closely as possible to 2400 MHz. Such action may jeopardize the viability of data-PCS systems and make reception of weak satellite downlink signals from amateur satellites difficult for many amateurs.

14. AMSAT recognizes the difficult nature of these proceedings and appreciates the Commission's attention to our comments amongst so many others. We believe that our comments plus those of the ARRL and a few of the commercial organizations participating, especially Apple Computer and Compaq are particularly relevant to achieving a satisfactory sharing of spectrum between worthy users without the additional administrative burden implicit if the Commission should adopt the proposals for upgrading the status of Part 15 devices in this part of the spectrum, as urged by some of the other participants, such as the Consumer Electronic Group of EIA, The Part 15 Coalition and Motorola. Furthermore, if it is concluded that these unlicensed Part 15 devices cannot share spectrum with amateurs, as inferred by Motorola, AMSAT urges that the Commission limit all new part 15 devices, designed to operate in this part of the spectrum, to 2450-2483.5 MHz.

RESPECTFULLY SUBMITTED,

Radio Amateur Satellite Corporation
P. O. Box 27
Washington, D.C. 20044

By William A. Tynan
William A. Tynan
President

April 4, 1995

CERTIFICATE OF SERVICE

I, Perry I. Klein, a Vice-President of the Radio Amateur Satellite Corporation, hereby certify that a copy of these comments were mailed this 4th day of April 1995, via U.S. Postal Service, postage prepaid, first class, to the following:

Christopher D. Imlay, Esq.
Booth, Freret & Imlay
1233 20th St., N.W., Suite 204
Washington, DC 20036
Counsel for The American Radio Relay League

Mary Dent, Esq.
Goldberg, Godles, Wiener & Wright
1229 19th St., N.W.
Washington, DC 20036
Counsel for Apple Computer Inc.

R. Michael Senkowski, Esq.
Wiley, Rein & Fielding
1776 K Street, N.W.
Washington, DC 20006
Counsel for Motorola, Inc.

Joseph P. Markoski, Esq.
Squire, Sanders & Dempsey
1201 Pennsylvania Avenue, N.W.
Washington, DC 20044
Counsel for Consumer Electronics Group, EIA

Henry Goldberg, Esq.
Goldberg, Godles, Wiener & Wright
1229 Nineteenth Street, N.W.
Washington, DC 20036
Counsel for The Part 15 Coalition

Ian D. Volner, Esq. & William Coston, Esq.
Venable, Baetjer, Howard & Civiletti, LLP
1201 New York Avenue, N.W., Suite 1000
Washington, DC 20005
Counsel for Compaq Computer

Perry I. Klein